

Pulse Improvement Program

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The Pulse Improvement Program at Horsham aims to release high yielding and disease resistant field pea, chickpea, lentil and faba bean varieties which meet required quality standards. As part of this program pulses are evaluated in the southern Mallee region to select varieties specifically suited to the soils and climate of this area.

The 1998 season in the southern Mallee of Victoria was characterised by an early break, a dry winter and spring, and severe frosts in October. Frosts caused flower abortion, seed death and severely affected seed quality in many crops. Rain in November was too late to benefit most pulses and yields were poor. Large aphid numbers on lentils and faba beans early in the season reduced yields and possibly caused virus problems in lentils. As in 1997, pulses performed poorly on heavy soils where subsoil limitations such as boron toxicity, salinity and sodicity may prevent roots accessing moisture at depth.

Field Pea

Mallee field pea trials were affected by moisture stress from July to September. However in contrast to average years, late season rainfall across the Mallee resulted in later flowering/maturing genotypes (Soupa, PSL4) showing a yield advantage over earlier types (Paravic, Excell). Despite the low spring rainfall, only the Birchip trial had high experimental error associated with low yields. Eight varieties were commercialised in 1997/1998 from the Australian Coordinated Field Pea Improvement Program. These were Morgan, Excell, PSI5 and Paravic from the Victorian breeding module and Soupa, M257-2-1 and M257-7-3 and Parafield from the South Australian breeding module. The variety Snowy has been replaced by its sister line PSI5 due to severe frost damage affecting the seed bulk up in 1998. Seed supply problems limited the testing of lines M257-2-1 and M257-7-3 in the Mallee.

Description of new varieties

Parafield (Elders/Paramount Seeds) - Parafield is a mid season maturity line similar to Dundale, but tends to be at least a week earlier flowering than Alma or Dun. The variety has conventional leaf, purple flowers and dun type seed.

Paravic (Elders/Paramount Seeds) - Paravic is a semi-dwarf pea with dun type grain. It is early flowering and early maturing. The variety shows fair to good standing ability at maturity. It has purple flowers and produces dun type dimpled seeds with a green to brown seed coat and a yellow cotyledon. The variety has shown a significant yield advantage over varieties currently grown in the Mallee, Wimmera and North central regions.

Morgan (Hart Brothers) - Morgan is being released for NSW as either a grain or speciality forage/hay/green manure type pea. Morgan is a purple flowered, semi-leafless pea with a vigorous tall and indeterminate growth habit. It lodges less at maturity than other tall types. It is late flowering, approximately 10-14 days later than Dundale. Seed type is small speckled and suitable for stockfeed. In variety trials in southern and central NSW Morgan has outyielded other stockfeed types such as Alma, Dun, Dundale and Glenroy.

M257-2-1 (Australian Barley Board / Australian Field Crops Association.) - M257-2-1 is a late flowering, and late maturing variety. It has a semi-dwarf, semi-leafless habit. The variety has fair to good standing ability at maturity. M257-2-1 has good resistance to powdery mildew. The variety is white flowered and produces grain which is white, large, round and smooth, suitable for splitting.

M257-7-3 (Australian Barley Board / Australian Field Crops Association.)- M257-7-3 is an early maturing variety similar to Bohatyr. It is a semi-dwarf, semi-leafless pea. The variety has good standing ability at maturity. The variety is white flowered and produces grain which is white, large, round and smooth, suitable for splitting.

PSI5 (Harvest Grain Australia) - This is a semi-dwarf, semi-leafless pea, but significantly taller than other short varieties such as Bluey, King, Magnet or Bonzer. The variety has good early vigour and stands erect at harvest. PSI5 is early flowering and maturing. The variety produces white flowers and smooth, round white seed suitable for splitting. This variety shows moderate resistance to downy mildew. The variety has shown a significant yield advantage over varieties currently grown in the Mallee, Wimmera, North central, North east and South west regions of Victoria.

Soupa (The Lentil Company) - Soupa is a semi-dwarf, tare leaf variety. The variety is late flowering and late maturing. The variety shows improved tolerance to ascochyta blight and good resistance to downy mildew. It produces white flowers and large blue seed suitable for splitting. The variety is also reputed to have bleaching resistance, which may be associated with later maturity.

Excell (Harvest Grain Australia) - Excell is a semi-dwarf, semi-leafless pea. The variety is significantly taller than other short varieties such as Bluey, King, Magnet or Bonzer. The variety has good early vigour and stands erect at harvest. Excell is early flowering and maturing. The variety produces white flowers and smooth, round blue seed suitable for splitting or canning. This variety shows moderate resistance to ascochyta blight and downy mildew. Excell has shown a significant yield advantage over varieties currently grown in the Mallee, Wimmera, North central, North east and South west regions of Victoria.

Table 1.13 Mallee advanced field pea trial yield data.

- Sites are ordered from highest to lowest yielding.
- Yield data is expressed as a percentage of the cultivars Paravic for Dun seeded types, PSI5 for white seeded types and Excell for blue seeded types.
- Yields significantly different from these standard varieties based on LSD Fprob 5% are marked with the symbol *.

Variety Site	Rainbow	Gowanford	Walpeup	Warne	Rosebery	Quambatook	Average
<i>Dun seeded</i>							
Paravic t/ha	1.81	1.44	1.44	1.24	1.05	0.94	1.32
Paravic	100	100	100	100	100	100	100
Dundale	95	93	102	110	96	106	100
Morgan	92	113	89	111	106	96	101
Parafield	104	118	114	123 *	112	117	115
N20.5	102	91	117	116 *	109	97	105
PSL11	90	98	96	112	98	111	101
PSL12	91	110	92	104	98	90	98
PSL13	97	107	96	99	96	105	100
PSL2	91	98	89	109	93	103	97
PSL3	108	100	101	124 *	106	110	108
PSL4	116	107	112	142 *	115 *	107	117
PSL5	109	101	105	126 *	96	105	107
PSL8	110	89	106	141 *	103	95	107
PSM7				133 *	142 *		
King					108		
Magnet					108		
Average LSD	22	21	24	16	14	27	

Variety Site	Rainbow	Gowanford	Walpeup	Warne	Rosebery	Quambatook	Average
White seeded							
PSI5 t/ha	1.79	1.20	1.57	1.45	1.12	1.22	1.39
PSI5	100	100	100	100	100	100	100
Snowy	97	109	106	82 *	99	81	96
Bohaytr	100	134 *	107	96	99	89	104
Laura	115	133 *	94	100	111	91	107
PSL1	96	98	80	92	93	75 *	89
PSL10	111	103	103	104	97	92	102
PSL6	108	104	93	102	104	83	99
PSL7	100	103	91	107	101	62 *	94
M257-7-3				109	94		
PSM3				107			
Average LSD	22	25	22	13	13	21	
Blue seeded							
Excell t/ha	1.67	1.13	1.45	1.24	1.06	0.96	1.25
Excell	100	100	100	100	100	100	100
Soupa	100	139 *	100	131 *	115 *	99	114
PSL9	108	115	95	96	99	104	103
Jupiter	85 *	85	85			105	90
Average LSD	23	26	24	16	13	27	
Site mean	1.80	1.37	1.46	1.40	1.07	0.98	1.35
CV %	13.1	12.9	15.6	8.9	8.9	15.6	

Chickpea variety evaluation

In 1998 the major focus of chickpea breeding, evaluation and production in Victoria was in combating the widespread damage caused by ascochyta blight. Ascochyta blight was prevalent in the Wimmera and some early chickpea crops in the southern Mallee. The disease did not develop to the same extent in the southern Mallee due to the dry season.

The advanced Mallee chickpea trials were not significantly affected by ascochyta blight. However very dry conditions resulted in relatively low yields (Table 1.14). The experimental line 8511.19 was the highest yielding chickpea across all sites. Compared to other named varieties, Lasseter performed well at all sites except Walpeup. Kabuli yields were generally poor. In the absence of ascochyta blight, the highest yielding chickpea varieties for the Mallee were Sona, Lasseter, Desavic and Tyson.

Mallee chickpea options for 1999

We were able to assess advanced chickpea entries for yield in the presence and absence of ascochyta blight at Horsham. Plots were sprayed fortnightly with a fungicide to control the disease. All advanced lines and varieties were found to be susceptible to the disease. Yield losses (without fungicide sprays) ranged from 54 to 99% (Table 1.14). Lasseter has been the highest yielding chickpea variety in the Wimmera but the disease reduced the yield of Lasseter by 99%. The Horsham results indicate clearly that growing susceptible varieties such as Lasseter, Gully and Desavic successfully in Victoria will be difficult. The less susceptible Sona and the new potential release 8511.19, still suffered significant yield losses. Growers who are planning to plant these varieties, would need to use a good disease control package, including preventative fungicide sprays.

Seed quality, stubble management, sowing time, use of seed dressings, fungicides and the weather all will have potentially a significant impact on the severity of ascochyta of chickpeas in 1999. Failure to implement all possible control measures could greatly affect crop yield.

The cost of fungicide applications required to control ascochyta blight may make chickpea production uneconomic in the Mallee with the current varieties. The desi line 8511-19 has better ascochyta blight resistance than current chickpea varieties but fungicide sprays are still likely to be required. This new variety is being multiplied in NSW but seed will be limited for two or three years. 8511.19 will be a useful variety in the medium term until new varieties possessing more effective resistance are available in commercial tonnages. The new material, that has effective resistance, consists largely of small seeded kabulis or black seeded desis. However, the best lines are being multiplied and crossed with well adapted varieties to provide a more stable basis for the chickpea industry in the future. Ascochyta blight resistance has now become the most important aim of the chickpea breeding program at Horsham.

Table 1.14. 1998 and long term Mallee advanced chickpeas (% Lasseter) yield results, and the % yield loss of advanced chickpea varieties grown without fungicide sprays.

	Horsham '98	Birchi p		Rosebery	Walpeup	Warne	Mallee 96-98
Lasseter t/ha	% yield loss with disease	0.82	0.98	0.74	0.68	0.98	1.00
Desis							
Sona	54	84	94	90	129	87	102
8511-19	55	95	98	102	136	89	102
Tyson	66	82	96	86	111	76	90
Dooen	69	78	85	75	104	64	82
Amethyst	71	74	84	98	132	93	-
Heera	72	85	91	96	114	89	-
Desavic	88	79	94	101	119	100	94
Gully	94	76	90	86	95	83	88
Lasseter	99	100	100	100	100	100	100
Kabulis							
Kaniva	67	73	80	61	58	85	76
Bumper	79	60	79	58	55	64	69
LSD P<0.05		23	14	14	34	15	

Lentil variety evaluation

In the northern Mallee and southern Wimmera many farmers grew lentils for the first or second time in 1998. Unfortunately for the second successive year, drought has resulted in very poor lentil yields, especially on heavy soils (Table 1.15). Drought, frost, damage from aphids, virus and crop yellowing resulted in variable and generally poor lentil yields in Victoria in 1998. The late October frost also severely affected seed quality.

In the southern Mallee, aphid numbers were high early in the season. Stunting symptoms were severe in trials at Rosebery and Birchip. Cucumber mosaic virus (CMV) was isolated from plants at Rosebery and Birchip. Alfalfa mosaic virus (AMV) was also isolated at Rosebery. The commercial varieties Cassab, Digger and the experimental line ILL7180 were clearly the highest yielding genotypes tested in the Mallee. These varieties also had the least stunting and yellowing (Table 1.15). The yields of Cobber, Cumra and Northfield were very poor compared with previous years.

In 1998 the advanced lentil yield trial at Kaniva was infected with botrytis grey mould. The severity of leaf symptoms differed between genotypes. Ansak, Digger, Cassab and ILL7180 had the least symptoms and Northfield had the most severe symptoms (Table 1.15). A nearby Digger crop showed no symptoms while Northfield crops had severe botrytis infection. Botrytis grey mould will be a serious disease of lentils in years with a wet spring. Sowing very early or at a high seeding rate will increase the likelihood of the disease occurring. sclerotinia has also been found in association with botrytis grey mould in the field.

Yield stability is still the major focus for lentil improvement in Australia. In 1998, Cassab and Digger were best suited to the difficult growing conditions and appeared to have lower levels of disease than other cultivars. Cassab and Digger also have good resistance to foliar infection by ascochyta blight. For stable yields these varieties are a good option for the southern Mallee. However, they do not have seed resistance to ascochyta blight which may affect seed quality. Northfield is the only variety currently with seed resistance to ascochyta blight. The variety Cumra is susceptible to ascochyta blight and likely to perform poorly in seasons favourable for disease.

In 1997 and 1998 lentil yields in the southern Mallee and northern Wimmera have been very poor on heavy soils where subsoil sodicity and boron toxicity may prevent the use of stored soil water deeper in the profile. This indicates that in any year rainfall during spring is essential for good yields on these soils. Lentils were also severely affected by salinity in 1998. In drought years lentils have been more successful on the lighter sandy loam soils.

Table 1.15 1998 and long term Mallee lentil yields (%Digger) and scores for virus (Rosebery) and botrytis grey mould symptoms (Kaniva).

Variety	Stunting	Botrytis	Birchip	Warn e	Roseber y	Longterm 1992-98	1996- 98	1997-98
Red Lentils	I no symptoms 9 dead							
<i>Digger T/Ha</i>			0.41	1.01	0.59			
Aldinga	4.3	3.3	19	52	28	83	89	77
Ansak	5.7	1.7	26	64	37			76
Cassab	2.0	2.0	84	105	104			100
Cobber	5.7	4.3	30	44	14	96	98	83
Cumra	6.3	2.6	41	59	54			84
Digger	2.5	2.0	100	100	100	100	100	100
ILL7180	3.3	2.3	87	87	96		106	104
Northfield	5.5	5.7	49	62	47	83	91	81
Green Lentils								
Matilda	7.5	4.3	32	62	43	79	83	80
Lsd P<0.05			17.3	9.9	19.9			
Cv (%)			24.6	10.3	24.6			

Faba bean variety evaluation

Faba bean evaluation in the southern Mallee in 1998 was expanded to include commercial varieties, experimental lines with dual resistance to ascochyta blight and chocolate spot, and early flowering lines. Faba bean varieties were also compared to two narbon bean lines.

The faba bean trial at Warne (Table 1.16) (north of Birchip) yielded well given the dry winter and spring, frost and high incidence of cowpea aphid (*Aphis craccivora*). Yields were comparable to those of field peas and better compared to lentils and chickpeas. The highest yielding entries were the new variety FiestaVF, several dual disease resistant varieties, ie ACC56/1, ACC1048/1 and ACC15/1 and the two narbon beans.

The majority of faba bean lines flowered between the third and forth week of August, whereas the narbon bean lines flowered in the first week of September. High temperatures during October caused many plants to abort their flowers, reducing yields. The late frost in October was less damaging to faba beans than to other pulse crops

Varieties that are early flowering and are resistant to both ascochyta blight and chocolate spot have greater potential for the southern Mallee. FiestaVF was comparable in yield to the narbon beans in that region.

Table 1.16 Yields (t/ha and % Fiord) of selected faba bean and narbon bean lines grown at Warne, 1998.

Variety	Mean yield (t/ha)	% Fiord
Faba Beans		
ACC56/1	1.48	119
ACC1048/1	1.47	117
ACC15/1	1.46	117
FiestaVF	1.37	110
Icarus	1.25	100
Fiord	1.25	100
Barkool	1.24	99
ACC612	1.24	99
Ascot	1.02	81
Aquadulce	0.76	61
Narbon Beans		
N9035*002	1.40	112
ATC60114	1.18	94
LSD (Fprob 5%)	0.21	17
CV (%)	9.1	